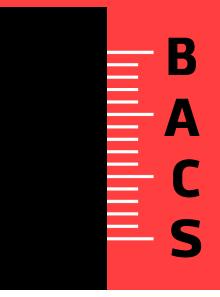
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Analytical Equipment

Applications



B A C S

Relevance

Currently, production performance enhancement is becoming as important as product quality assurance.

How can we achieve it?



Higher level of automation, fewer manual operations



Cut down costs on material recycling and disposal of rejected products



Enhance performance of existing units

An optimum solution for these tasks is **continuous composition monitoring** of raw materials and products by process chromatographs and gas analyzers.

Natural and Associated Gas Processing

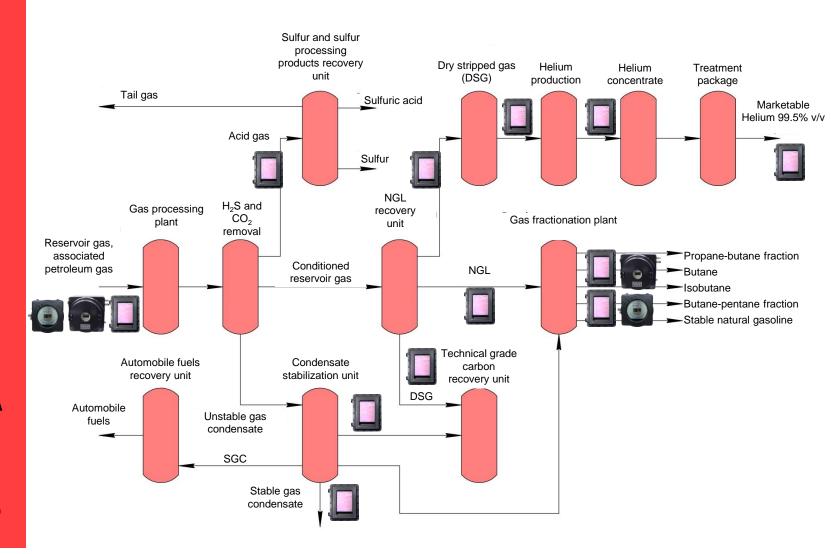


Ex-marked analytical equipment is designed for continuous and automatic content measurement of various gas components.





Gas Processing Flow Diagram





Compositional Analysis of Natural Gas

For gas producers, transporters and consumers, precise and fast compositional analysis with further calorific value determination is of utmost importance.

Since the cost of natural gas is determined by its calorific value, precision of compositional analysis defines the profitability of the production.

Online monitoring of process units operation at a GPP by automatic analysis operations will allow you to prevent or considerably reduce production downtime and optimize the facility performance.







Compositional Analysis of Natural Gas

Chromatograph MAG



Compositional analysis according to ISO 6974;



Calorific value calculation based on compositional analysis, relative and absolute density, compressibility factor and the Wobbe index in accordance with ISO 6976.

Additional analysis options

- Methanol
- Helium and hydrogen
- Extended hydrocarbon compositional analysis





Compositional Analysis of Natural Gas

Chromatograph MAG-S



To determine mass concentration of hydrogen sulfide and mercaptans according to ASTM D 7493 and ISO 19739.

Oxygen Analyzer AnOx





Moisture Analyzer HygroScan



To measure mass concentration of **moisture** and water **dew point** (WDP) at operating pressure.







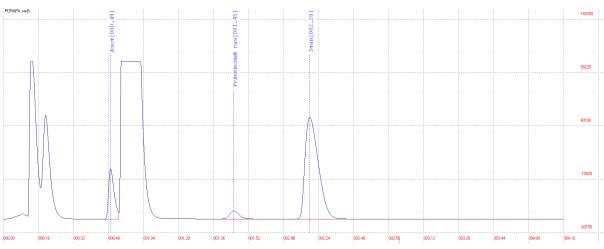
Compositional analysis of natural gas

Features			
Analyzed medium	Gas		
	Nitrogen (with oxygen), methane, CO ₂ ,		
Analyzed components	ethane, propane, isobutane, n-butane,		
	neopentane, isopentane, n-pentane,		
	hexanes + superior		
Detector type	TCD		
Number of analytical channels	2		
Column type	Narrow-bore		
Carrier gas	Helium		
Duration of analysis	6:00 [min:s]		

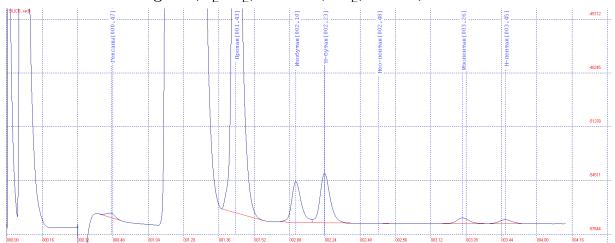




Compositional analysis of natural gas



Channel 1 chromatogram $(N_2+O_2, methane, CO_2, ethane)$



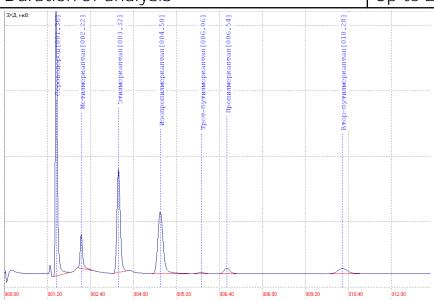
Channel 2 chromatogram (propane, isobutane, n-butane, neopentane, Isopentane, n-pentane, C_{6+})





Mass concentration measurement for sulfur compounds in natural gas.

Features		
Analyzed medium	Gas	
A	Hydrogen sulfide, mercaptans C1-C4,	
Analyzed components	carbonyl sulfide (optional)	
Detector type	ECD	
Number of analytical channels	1	
Column type	Capillary	
Carrier gas	Air	
Duration of analysis	Up to 20:00 [min:s] (to n-butyl mercaptan)	



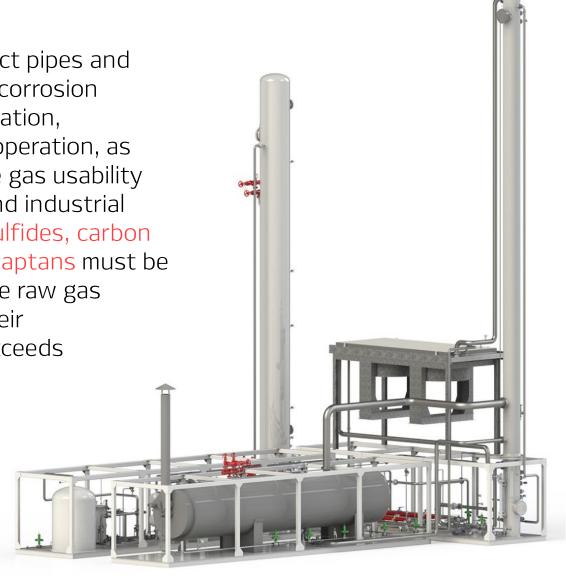
Channel 1 chromatogram



Acid Gas Removal

In order to protect pipes and equipment from corrosion during transportation, processing and operation, as well as to ensure gas usability for household and industrial use, hydrogen sulfides, carbon dioxide and mercaptans must be removed from the raw gas stream, when their concentration exceeds permitted level.







Acid Gas Removal

Process Monitoring

To determine mass concentration of hydrogen sulfide and carbon dioxide upstream and downstream of the treatment package



MAG chromatograph with 2 types of detectors: ECD and TCD

Treatment quality control

Catalyst activity monitoring

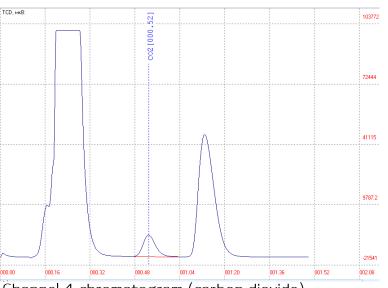
Lower power consumption due to optimal process control solutions

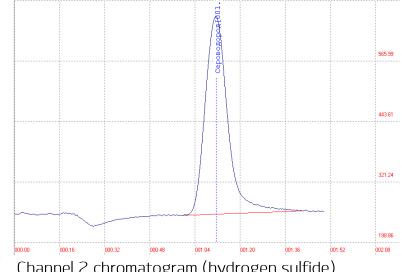




Hydrogen sulfide and carbon dioxide content monitoring, in natural gas downstream of acid gas removal plant (amine treatment)

Features		
nalyzed medium Gas		
nalyzed components Carbon dioxide, hydrogen sulfide		
Detector type TCD, ECD		
Number of analytical channels	2	
Column type	Micropacked, capillary	
Carrier gas	Helium, air	
Duration of analysis	3:00 [min:s]	





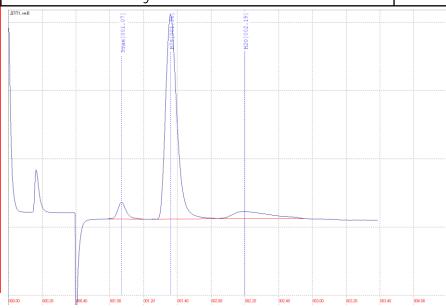
Channel 1 chromatogram (carbon dioxide)

Channel 2 chromatogram (hydrogen sulfide)



Analysis of sulfurous gas passing from the amine treatment plant to the Claus plant.

Features		
Gas		
Hydrogen sulfide (up to 95%), ethane,		
water		
TCD		
1		
Micropacked		
Helium		
3:50 AM [min:s]		



B A C



NGL Recovery

Continuous Quality Control



Primary materials:

- Conditioned reservoir gas
- Associated petroleum gas



Marketable product:

- Dry stripped gas (methane, partly ethane)
- Natural gas liquids $(C_3-C_5H_{12 + superior})$



Chromatograph MAG

Compositional analysis



Analyzer **HygroScan** To measure

Humidity and **WDP**

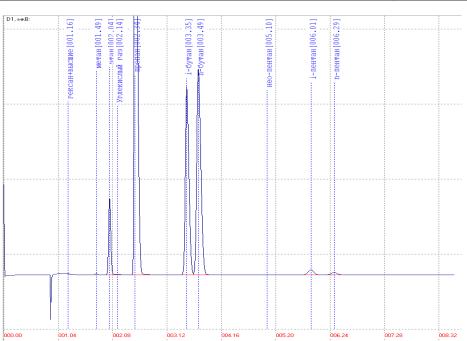


Analyzer AnOx Measurement of oxygen volume ratio



Natural gas liquids (NGL) recovery process control

Features		
halyzed medium Liquefied gas		
nalyzed components C_1 - C_6 hydrocarbons, carbon dioxide		
Detector type	TCD	
Number of analytical channels	1	
Column type	Micropacked	
Carrier gas	Helium	
Duration of analysis	9:55 AM [min:s]	

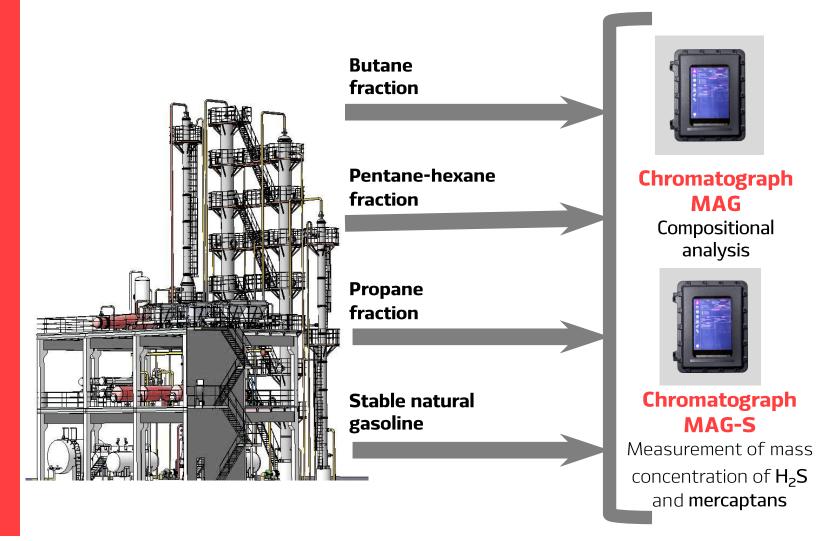


| B | A | C | S

Channel 1 chromatogram



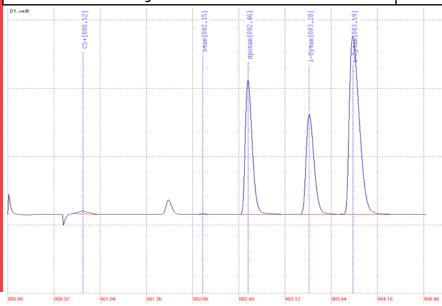
Gas Fractionation Plant





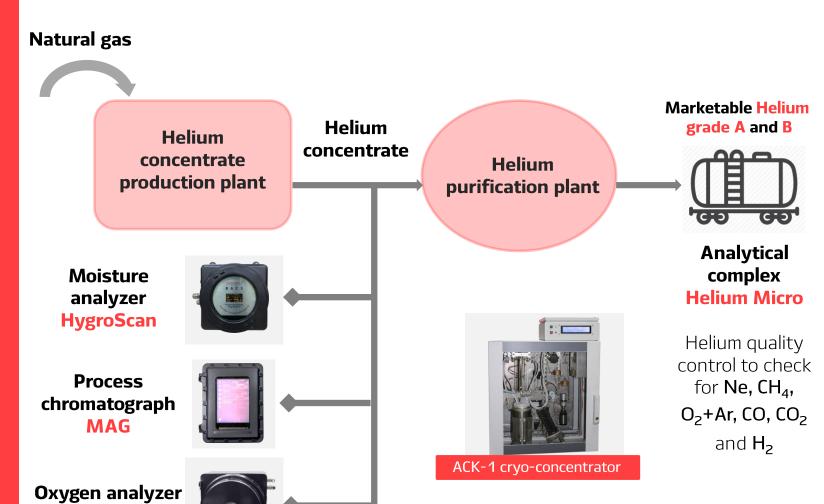
Composition monitoring for GFP produced propane and butane fractions

Features		
nalyzed medium Liquefied gas		
Analyzed seminorate	Ethane, propane, isbutane, n-butane (in	
Analyzed components	propane fraction)	
Detector type	TCD	
Number of analytical channels	1	
Column type	Micropacked	
Carrier gas	Helium	
Duration of analysis	5:50 AM [min:s]	





Helium Production



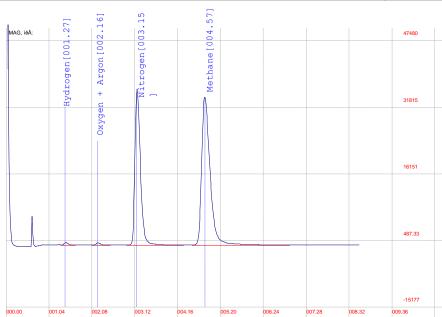
B A C S

AnOx



Helium concentrate analysis

Features		
nalyzed medium Gas		
Analyzed components	Hydrogen, methane, oxygen + argon,	
Analyzed components	nitrogen	
Detector type	TCD	
Number of analytical channels	ytical channels 1	
Column type	Packed	
Carrier gas	Helium	
Duration of analysis	10:00 AM [min:s]	





Reference List

No.	Customer	Location	Objectives
1	PJSC Gazprom Neft	GFP-2, Omsk Refinery	Marketable n-butane quality control
2	PJSC ANK Bashneft	Sulfur removal and sulfur processing plant	H ₂ S content in sulfurous gas at tank outlet E-138
З	Gazprom Dobycha Orenburg LLC	Amine treatment unit, item 02AT1	Analysis of H ₂ S and CO ₂ content in natural gas (pilot testing)
4	Gazprom Dobycha Orenburg LLC (Helium plant)	Plant No.1 in shop No.1, helium fine purification section entrance	Process monitoring for impurities in helium concentrate
5	PJSC Tatneft	Tatneftegazpererabotka, GFP- 2, shop No.2	LPG analysis (propane fraction)
6	PJSC Tatneft	Tatneftegazpererabotka, GFP- 2, shop No.2	LPG analysis (n-butane fraction)





Reference List

No.	Customer	Location	Objectives
7	JSC ROSPAN INTERNATIONAL (Complex Gas and Condensate Treatment Plant, Vostochno- Urengoiskoye license area)	Condensation stabilization package No.1. Condensation stabilization package's line	LPG analysis (propane - technical grade butane)
8	PJSC NK Rosneft	CJSC Neftegorsky Gas Processing Plant	Quantity and quality parameters measurement system for dry stripped gas supplied to fuel network of OJSC Samaraneftegaz (Gas Quantity Metering System SIKG-4)
9	PJSC NK Rosneft	JSC Novokuibyshevsk Refinery	Supply of chromatography package based on chromatograph MAG, for compositional analysis of natural gas and determining physical and chemical properties of gas.

The list is not exhaustive.

For further information, contact out specialists to get a reference list

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